

**WHAT IS CLAIMED IS:**

1. A method for selectively eliminating latencies in the exchange of control messages within a network during the re/convergence of the network, said method comprising  
5 the steps of:

classifying the to-be-transmitted control messages into either low-priority control messages or high-priority control messages;

limiting the transmission rate of the low-priority  
10 control messages; and

immediately transmitting the high-priority control messages that contain information that contributes to the re/convergence of an unstable topology to a stable topology in the network.

15 2. The method of Claim 1, wherein the network is a RSTP-based network and the control messages are Bridge Protocol Data Units.

3. The method of Claim 1, wherein the transmission rate of the low-priority control messages is limited in  
20 accordance with a traditional IEEE 802.1 RSTP.

4. The method of Claim 1, wherein the high-priority control messages are created when a bridge in the network becomes a new root bridge.

5. The method of Claim 1, wherein the high-priority  
25 control messages are created when a bridge in the network has to reroot a port towards a new root bridge.

6. The method of Claim 1, wherein the high-priority control messages are created when a bridge in the network has to advertise information about a new root bridge to another bridge.

5        7. The method of Claim 1, wherein the high-priority control messages are created when a bridge detects a topology change on one of its ports.

8. The method of Claim 1, wherein said step of immediately transmitting is performed when an allSynced  
10 condition is defined as TRUE if and only if synced is TRUE for all ports for a given tree other than the given port.

9. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#1 in TABLE #2 that is related to the selective  
15 transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new  
20 superior information; and

wherein said Set#1 requires: (1)  $1 < txHoldCount \leq 10$  and (2) RSTP fully stable in a topology.

10. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#2 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages and  
5 the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - detects a topology change on one of its ports; and
- wherein said Set#2 requires: (1) Set#1 modifications; (2)  $1 < txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.

11. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#3 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages and  
5 the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - detects a topology change on one of its ports;
  - has to propagate at least the first Topology Change Notification message received by a port; and
- 15 wherein said Set#3 requires: (1) Set#2 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.

12. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#4 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages using  
5 Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- 10 • does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or  
15 more Topology Change Pre-Notification message; and

wherein said Set#4 requires: (1) Set#1 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

13. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#5 in TABLE #2 that is related to a port becoming enabled and the selective transmission of Topology Change Notification messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
- has a port becoming enable; and

wherein said Set#5 requires: (1) Set#4 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

14. The method of Claim 1, wherein said step of immediately transmitting is performed in accordance with Set#6 in TABLE #2 that is related to a port becoming alternate discarding and a port becoming enabled and the selective transmission of Topology Change Notification  
5 messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - 10 • reroots due to the fact that it received superior information from another bridge;
  - does not reroot but similarly has to advertise new superior information;
  - has to propagate at least one Topology Change  
15 Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
  - has a port becoming enable;
  - has a port becoming alternate discarding; and
- 20 wherein said Set#6 requires: (1) Set#5 modifications; (2)  $1 \leq \text{txHoldCount} \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

15. A network comprising:

a plurality of links;

a plurality of bridges coupled to the links, each bridge executing a protocol that selectively eliminates  
5 latencies in the exchange of control messages between bridges during the re/convergence of the network by:

classifying the to-be-transmitted control messages into either low-priority control messages or high-priority control messages;

10 limiting the transmission rate of the low-priority control messages; and

immediately transmitting the high-priority control messages that contain information that contributes to the re/convergence of an unstable  
15 topology to a stable topology in the network.

16. The network of Claim 15, wherein the transmission rate of the low-priority control messages is limited in accordance with a traditional IEEE 802.1RSTP.

17. The network of Claim 15, wherein the high-  
20 priority control messages are created when one of the bridges in the network becomes a new root bridge.

18. The network of Claim 15, wherein the high-priority control messages are created when one of the bridges in the network has to reroot a port towards a new  
25 root bridge.



19. The network of Claim 15, wherein the high-priority control messages are created when one of the bridges in the network has to advertise information about a new root bridge to another bridge.

5        20. The network of Claim 15, wherein the high-priority control messages are created when a bridge detects a topology change on one of its ports.

21. The network of Claim 15, wherein said step of immediately transmitting is performed when an allSynced  
10 condition is defined as TRUE if and only if synced is TRUE for all ports for a given tree other than the given port.

22. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#1 in TABLE #2 that is related to the selective  
15 transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new  
20 superior information; and

wherein said Set#1 requires: (1)  $1 < txHoldCount \leq 10$  and (2) RSTP fully stable in a topology.

23. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#2 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages and  
5 the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - detects a topology change on one of its ports; and
- wherein said Set#2 requires: (1) Set#1 modifications; (2)  $1 < txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.

24. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#3 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages and  
5 the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - detects a topology change on one of its ports;
  - has to propagate at least the first Topology Change Notification message received by a port; and
- 15 wherein said Set#3 requires: (1) Set#2 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.

25. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#4 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages using  
5 Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or  
15 more Topology change Pre-Notification message; and
- wherein said Set#4 requires: (1) Set#1 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

26. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#5 in TABLE #2 that is related to a port becoming enabled and the selective transmission of Topology Change Notification messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
- has a port becoming enable; and

wherein said Set#5 requires: (1) Set#4 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

27. The network of Claim 15, wherein said step of immediately transmitting is performed in accordance with Set#6 in TABLE #2 that is related to a port becoming alternate discarding and a port becoming enabled and the selective transmission of Topology Change Notification  
5 messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- 10 • reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change  
15 Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
- has a port becoming enable;
- has a port becoming alternate discarding; and
- 20 wherein said Set#6 requires: (1) Set#5 modifications;  
(2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

28. The network of Claim 15, wherein the network is a RSTP-based network.

25 29. The network of Claim 15, wherein the network is a local area network.

30. The network of Claim 15, wherein the network is a bridged local area network.

31. The network of Claim 15, wherein the network is a metropolitan area network.

5        32. A device comprising:  
a plurality of state machines that selectively eliminates latencies in the exchange of control messages during the re/convergence of a network by:  
classifying the to-be-transmitted control  
10        messages into either low-priority control messages or high-priority control messages;  
limiting the transmission rate of the low-priority control messages; and  
immediately transmitting the high-priority  
15        control messages that contain information that contributes to the re/convergence of an unstable topology to a stable topology in the network.

33. The device of Claim 32, wherein said device is at layer 2 of the Open Systems Interconnection reference  
20        model.

34. The device of Claim 32, wherein said device is a bridge, switch or router.

35. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#1 in TABLE #2 that is related to the selective transmission of Bridge Protocol Data Units when a bridge:

- 5       • becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information; and

10 wherein said Set#1 requires: (1)  $1 < txHoldCount \leq 10$  and (2) RSTP fully stable in a topology.

36. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#2 in TABLE #2 that is related to the selective  
15 transmission of Topology Change Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior  
20 information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- detects a topology change on one of its ports; and

wherein said Set#2 requires: (1) Set#1 modifications; (2)  
25  $1 < txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.



37. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#3 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages and  
5 the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
  - reroots due to the fact that it received superior information from another bridge;
  - 10 • does not reroot but similarly has to advertise new superior information;
  - detects a topology change on one of its ports;
  - has to propagate at least the first Topology Change Notification message received by a port; and
- 15 wherein said Set#3 requires: (1) Set#2 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable in a topology.

38. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#4 in TABLE #2 that is related to the selective transmission of Topology Change Notification messages using  
5 Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- 10 • does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or  
15 more Topology change Pre-Notification message; and

wherein said Set#4 requires: (1) Set#1 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

39. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#5 in TABLE #2 that is related to a port becoming enabled and the selective transmission of Topology Change Notification messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
- has a port becoming enable; and

wherein said Set#5 requires: (1) Set#4 modifications; (2)  $1 \leq txHoldCount \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.

40. The device of Claim 32, wherein said step of immediately transmitting is performed in accordance with Set#6 in TABLE #2 that is related to a port becoming alternate discarding and a port becoming enabled and the selective transmission of Topology Change Notification messages using Topology Change Pre-Notification messages and the selective transmission of Bridge Protocol Data Units when a bridge:

- becomes a new root bridge;
- reroots due to the fact that it received superior information from another bridge;
- does not reroot but similarly has to advertise new superior information;
- has to propagate at least one Topology Change Notification message on one or more ports when the bridge has just either generated or received one or more Topology change Pre-Notification message;
- has a port becoming enable;
- has a port becoming alternate discarding; and

wherein said Set#6 requires: (1) Set#5 modifications; (2)  $1 \leq \text{txHoldCount} \leq 10$  and (3) RSTP fully stable or not fully stable in a topology.